UTC INSTITUTE FOR ADVANCED SYSTEMS ENGINEERING DISTINGUISHED LECTURE SERIES

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1:00 - 2:00PM
UConn, Storrs Campus – ITEB 336
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Challenges in the Application of Mathematical Programming Approaches to Enterprise-wide Optimization of Process Industries

Enterprise-wide optimization (EWO) is a new emerging area that lies at the interface of chemical engineering and operations research, and has become a major goal in the process industries due to the increasing pressures for remaining competitive in the global marketplace. EWO involves optimizing the operations of supply, production and distribution activities of a company to reduce costs and inventories. A major focus in EWO is the optimization of manufacturing plants as part of the overall optimization of the supply chain. Major operational items include production planning, scheduling, and control. This talk provides an overview of major modeling and computational challenges in the development of deterministic and stochastic linear/nonlinear mixed-integer optimization models for planning and scheduling for the optimization of plants and entire supply chains that are involved in EWO problems. We address the following major challenges in this area: a) multi-scale optimization, b) linear vs. nonlinear models, c) handling of uncertainty and disruption, d) multiobjective and multilevel optimization. We illustrate these challenges in areas such as industrial gases, petroleum processing, and chemical process networks. These problems have been addressed in collaboration with industry, and have led to substantial economic savings.

Ignacio Grossmann

Ignacio E. Grossmann is the R. R. Dean University Professor of Chemical Engineering, and former Department Head at Carnegie Mellon University. He obtained his B.S. degree at the Universidad Iberoamericana, Mexico City, in 1974, and his M.S. and Ph.D. at Imperial College in 1975 and 1977, respectively. He is a member and former director (2005-2015) of the "*Center for Advanced Process Decision-making*," an industrial consortium that involves about 20 petroleum, chemical, engineering and software companies. He is a member of the National Academy of Engineering, and associate editor of *AIChE Journal*. He has received the following AIChE awards, Computing in Chemical Engineering, William H. Walker for Excellence in Publications, Warren Lewis for Excellence in Education, and Research Excellence in Sustainable Engineering. In 2015 he was the first recipient of the Sargent Medal by the IChemE. He has honorary doctorates from Abo Akademi in Finland, University of Maribor in Slovenia, Technical University of Dortmund in Germany, University of Cantabria in Spain, and from the Russian Kazan National Research Technological University. He has been named Thomson Reuters Highly Cited Researcher in 2014-2016. His research interests are in the areas of mixed-integer, disjunctive and stochastic programming, energy systems including petroleum, shale gas and biofuels, water networks, and planning and scheduling for enterprise-wide optimization. He has authored more than 500 papers, several monographs on design cases studies, and the textbook "Systematic Methods of Chemical Process Design," which he co-authored with Larry Biegler and Art Westerberg. He has also organized the Virtual Library on Process Systems Engineering. Professor Grossmann has graduated 56 Ph.D. and 11 M.S. students.

Key Words

Supply Chain Optimization | Mixed-integer Programming | Stochastic Programming
Multilevel Optimization | Multiobjective Optimization

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